The Future of Ecological Risk Assessment

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The Future of Ecological Risk Assessment[1]

by

Robert T. Lackey[2]

Abstract

Risk assessment has become a popular tool to help solve ecological problems. The basic concept is not new and has been applied to diverse decision problems. The application to ecological problems, especially complex ecological problems, is fairly recent and controversial. The fundamental and most important elements of the controversy revolve around two key points: (1) a person's implicit "world view;" and (2) the assumption of who (or what) receives the benefits and who (or what) pays the costs for ecological "decisions." A person's attitude toward risk assessment is, at least implicitly, defined by a world view. It is this world view that defines how each of us reacts to risk assessment applied to ecological problems. How the question of benefits and costs is defined also defines the appropriate use, if any, of ecological risk assessment. The future of ecological risk assessment will almost certainly follow the course of other analytical tools -- enthusiastic support, rapid, widespread adoption and use, then disillusionment and rapid replacement with newer approaches, but with continued use for a greatly constrained set of ecological issues.

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[1] Modified from a presentation given at the Symposium: *Ecological Risk Assessment: Use, Abuse, and Alternatives*, Oregon State University, Corvallis, Oregon, November 15 - 16, 1994. The views and opinions expressed do not necessarily reflect policy positions of the Environmental Protection Agency or any other organization.

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Introduction

There are many opinions about the philosophical and moral basis for ecological risk assessment, how risk assessment is used, how it is abused, and what a better alternative might be. The definition of ecological risk assessment ("the process that evaluates the likelihood that adverse ecological effects are occurring, or may occur, as a result of exposure to one or more stressors") seems simple enough, but an entire symposium has been devoted to evaluating the philosophical basis for ecological risk assessment and what alternatives might be appropriate. No consensus emerged and it was one of the most intellectually and emotionally divisive meetings I have ever attended. The interesting question to me is: why is this issue so divisive?

An analysis of the debate over ecological risk assessment shows that some individuals have dramatically different positions and share little in common, but others accept the same basic philosophical tenets and differ on relatively minor points (Lackey, 1994; 1997). Some individuals pitch the classical risk paradigm of commerce, industry, and insurance adapted for ecological problems with little modification, while others challenge the very foundation and morality of the commonly used approach. Many individuals offer modifications, or caution us about the circumstances for using risk assessment. A few offer alternatives. It is not my purpose to advocate any particular view, but rather to try to understand the nature of the debate.

It is easy to sink into the mire of detail of how to conduct ecological risk assessments or the advantages and disadvantages of various analytic tools. The ecological risk literature is dominated by a preoccupation with technique and practice. The important debate, however, revolves around two key points: (1) a person's implicit "world view;" and (2) the assumption of who (or what) receives the benefits and who (or what) pays the costs for ecological "decisions."

A Proposed World View

We all look at risk assessment implicitly using a *five dimensional world view*. Our reaction to ecological risk assessment as a concept and tool is probably also defined by one's collective positions on *each* of these five elements. Much of the debate over risk assessment may be couched in arguments over the details of *how* to do a risk assessment, but the debate is fundamentally over differences in elements of the world view.

The ***first*** and most important dimension to a world view is our perception of the condition of our *transport.* Recognized or not, we are *all* on a journey through our lives and the lives of our ancestors and progeny. As individuals and as a society, *what is the ecological condition of our transport?* Are we passengers on the Titanic -- or are we aboard the Loveboat? The Titanic view is that we are in deep trouble on ecological issues. Something needs to be done *now* or the planet is going down the tube. Biological diversity is disappearing

at a crisis rate; human population growth is the number one problem; the icebergs are there, they are formidable and unforgiving, and the consequences are obvious and catastrophic. From the Titanic perspective, risk assessment is nothing more than the government rearranging deck chairs while telling passengers: "Trust me. I'm from the government and things are under control."

But others take what might be best called the Loveboat view. Yes, there are some choices we have to make concerning ecological issues, but there are also choices about economic well being, individual freedom, and the aspirations of economically less well off individuals and groups. Within limits, however uncertain these limits might be, we can use the natural world for the betterment of us all. Our financial resources and energies are limited and we ought to balance the needs of the natural environment against other needs of society. Compromise is the order of the day and works best in a democracy --- after all is said and done. From the Loveboat perspective, risk assessment is a reasonable attempt to bring rationality to solving important public choice questions, but we don't have an ecological crisis that existing institutions cannot handle.

The *second* dimension of our world view is the *confession*. We have all read or heard the results of risk assessments, but are they to be believed and trusted? *These* are the confessions. Specifically, are risk assessments *in practice* accurate, unbiased, impartial analyses, or are they so tainted with hidden assumptions and value-based decisions that they are virtually worthless in public policy debates and might even be misleading? If they are misleading, is it intentional? If it is intentional, what agenda is being advanced?

Now I call this element of our world view the issue of the ***confession*** because it is well known that with sufficient torture, a prisoner will confess to any transgression. Only the creativity of the torturer limits the range of possible confessions. Such has been said about benefit/cost analysis, ecological modeling, environmental impact analysis, and --- yes --- even risk assessment. The risk assessment "problem" can be defined in such narrow terms as to make the analysis technically feasible, but the results are misleading to the real policy debate. Few go as far as alleging that scientists and analysts are tortured to provide the *right* answers, but the role of funding, career rewards, and prestige can be every bit as effective in the hands of skillful individuals and organizations as is torture for a creative and committed prison guard. For those individuals who do not trust the *process* of conducting risk assessments, the *results* (the confessions) will be equally untrustworthy. Some participants in the debate appear to be concerned about the nature of the confession; others are not.

The *third* dimension of one's world view is the *gospel* -- some speakers have followed the gospel of *enlightenment* and some followed the gospel of *rationality*.

The gospel of *enlightenment* is defined by a moral code, a set of religious beliefs, some ethical tenets from deep ecology, new age religion, Rush Limbaugh, or from any other source. The point is that there *is* a truth. Some argue that this view is the antithesis of the scientific

enterprise. Others allege that some scientists (particularly "ecologists") wear the cloak of the scientist, but actually practice enlightenment of a religious "environmentalism."

Others follow the gospel of *rationality* -- society has to balance competing alternatives, and risk assessment helps do this. Closely tied to the gospel of rationality is the mantra of *win-win*. Such a secular icon as *win-win* is intrinsically appealing to rationalists. While the gospel of *enlightenment* is highly skeptical of ecological risk assessment, ecological risk assessment is *so* logical and obvious, according to the gospel of *rationality*, that it must be difficult for these adherents *to even see* the dichotomy.

The *fourth* dimension of one's world view is the *schedule*. A fact of life is that trains need to run on time. Governments have collapsed because they could not deliver on this simple requirement. The public expects government, at a minimum, to execute housekeeping tasks effectively and efficiently. Democracy is often perceived to be --- and it may well be --- inversely proportional to efficiency. Regulating the use of chemicals, protecting ecological resources, preserving biological diversity, for example, are legitimate tasks of government and we ought to have *professionals* accomplish these tasks in the most efficient manner possible. A government that cannot accomplish these things, or keep the trains running on time, is a failure. Let the professionals handle these things!

Or, alternatively, is it really that important to keep the trains running on time? Perhaps we ought to ask: what really happens if the schedule slips? What happens if the trains run only when they are full? Where are the trains going? Do we even need trains? Are people better off with or without trains and their cursed schedules? Governments and bureaucracies will tend to see the problem as one of how to make them run on time; society *might* be best served if we looked at the alternatives to mobility. In short, it is how the ecological *problem* is formulated in ecological risk assessment that is most critical to society. How the problem is formulated will largely define the answer.

The *fifth* dimension of our probable world view might best be described as the *water glass* phenomenon. A glass with a water level midway is half full --- and half empty. How the level is viewed totally depends on the viewer. The concept of *risk* for ecological issues is also entirely defined by the viewer. Risk is singularly a human construct. One person's risk may well be another's benefit. For example, wild horses in North America may be regarded as either a benefit, a noble treasure of the west, or as a risk, a biological pest that ought to be eradicated to protect "native" fauna and flora.

Part of the difficulty with applying *risk* assessment is that, by definition, risk is *adverse*. In ecological systems there is no "good" nor any "bad," and certainly nothing "adverse." In contrast, an ecological "change" is labeled "adverse" by individuals, organizations, or societies. The only way to convert an ecological characteristic to adverse is to make a value judgment. To conduct a risk assessment means that *someone* made a value judgment of which ecological condition will be defined as *adverse*. Who makes such choices: the professional

elite? those in power? the general public? elected officials? Are scientists and their fellow travelers being used as tools in what is essentially a debate over values? Or, are scientists using the process of risk assessment to impart *their* values? Most participants in the debate over the appropriateness of ecological risk assessment skillfully evade this issue -- or raise it ever so tactfully.

Benefits and Costs

Apart from one's world view, how one formulates and answers the question of benefits and costs defines the appropriate role, if any, of ecological risk assessment. More specifically, the question is: "who receives benefits and who pays the costs?" Two views of the world compete.

The first, most comfortable to most of us and the most amenable to scientific information, is the *anthropocentric* view of the earth and its resources. The assumption is that all benefits from decisions affecting ecological systems are accruable to humans. To be sure, we may preserve wilderness that few actually visit, protect from extinction obscure species that have no tangible value, and spend vast sums to restore habitats for species of very limited market value. All these efforts still provide benefits to people; the benefits may be non-market, non-monetary, and merely a way to "buy" some indeterminant form of future insurance, but they all benefit man. Nature may benefit, but only as a byproduct of the primary decision. The entire regulatory framework to protect ecosystems is set up, at least implicitly, under this assumption. We protect biodiversity because some people believe bad things may happen to future generations if we do not. We preserve wilderness areas because just knowing that unaltered ecosystems exist has value to people.

The alternate world view is ecocentered, often called *earth-centered.* This is the realm of deep ecology and certain religious or philosophical creeds. The basic tenet is that benefits accrue to all species; humans are only one species and are no more important than the others. It follows, then, that all species must be treated equally. We protect ecosystems because all animals and plants have a right to exist. The importance of biodiversity is because it is morally right, not because biodiversity is or might be important to man. From an anthropocentric perspective, risk assessments weighs ecological alternatives from the value to man.

Risk assessment, at least as currently formulated, is an anathema to those holding the earth-centered view. The mere discussion of ranking risks to ecosystems would be similar to deciding which humans should live or die. The intensity of the debate about the morality of abortion is similar philosophically. The debate is morally based; rational argument plays little or no role. For example, from this philosophy come uncomfortable questions such as: "Should we be subjecting thousands of animals to suffering so the fragrances of our shampoos do not sting our eyes?" It is easy to dismiss this view in a room full of rationalists, but the ecocentric view is becoming increasingly important in the political process. For those individuals who

hold an ecocentric world view, or those who lean in this direction, risk assessment will not be well received. From an ecocentric perspective, risk assessment will likely be perceived as a form of ecological triage.

Conclusion

What, then, is the future of ecological risk assessment? Of course, there is no definitive answer, but whatever the future is for ecological risk assessment, it will depend in large part on the emerging consensus on the five elements of a world view and in the answer to the fundamental question of who (or what) receives benefits and who (or what) pays costs (anthropocentric vs. ecocentric).

If the past is a guide, the future of ecological risk assessment will follow the course of other tools such as bioassays, environmental impact assessments, modeling, expert systems, geographic information analysis, total quality management, and adaptive management --- initial enthusiastic support, rapid, widespread adoption and use, then disillusionment and rapid replacement by newer approaches, but with continued use for a greatly constrained set of ecological issues.

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About the Author:

Dr. Robert T. Lackey, senior fisheries biologist at the U.S. Environmental Protection Agency's research laboratory in Corvallis, Oregon, is also courtesy professor of fisheries science and adjunct professor of political science at Oregon State University. Since his first fisheries job more than four decades ago mucking out raceways in a trout hatchery, he has dealt with a range of natural resource issues from positions in government and academia. His professional work has involved many areas of natural resource management and he has written 100 scientific and technical journal articles. His current professional focus is providing policy-relevant science to help inform ongoing salmon policy discussions. Dr. Lackey also has long been active in natural resources education, having taught at five North American universities. He continues to regularly teach a graduate course in ecological policy at Oregon State University and was a 1999-2000 Fulbright Scholar at the University of Northern British Columbia. A Canadian by birth, Dr. Lackey holds a Doctor of Philosophy degree in Fisheries and Wildlife Science from Colorado State University, where he was selected as the 2001 Honored Alumnus from the College of Natural Resources. He is a Certified Fisheries Scientist and a Fellow in the American Institute of Fishery Research Biologists.

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